

# New state record and range extension of the Big Crested Mastiff Bat, *Promops centralis* Thomas, 1915 (Chiroptera, Molossidae), in Veracruz, Mexico

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## Abstract

The diversity of bats in the Mexican state of Veracruz is high, comprising 89 species. Many of these species deserve special attention because either they remain underrepresented in collections, or they are known from fewer than 5 localities. We confirm the presence of the Big Crested Mastiff Bat (*Promops centralis*) in Veracruz, and provide additional occurrence records that extend the known geographic distribution of this species by 216 km to the north from previously known sites. Our new record represents the northernmost record of the species on the coastal plain of the Gulf of Mexico. Our findings highlight the presence of gaps in past surveys of mammalian diversity in Veracruz.

## Key words

Bats, Chiroptera, diversity, geographic distribution, distribution extension, new records.

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## Introduction

Free-tailed bats are aerial insectivores with a pantropical distribution (Simmons 2005, Eger 2008). The family Molossidae currently includes over 16 genera and 100 species (Simmons 2005), 11 genera and 39 species with distribution in the Neotropics (Flores et al. 2015). Nine species of the genera *Eumops*, *Molossus*, *Nyctinomops*, *Promops*, and *Tadarida* are found in the state of Veracruz, Mexico (Table 1; González-Christen and Delfín-Alfonso 2016).

The genus *Promops* Gervais, 1855 currently includes 3 species: *P. centralis* Thomas, 1915; *P. davisoni* Thomas, 1921; and *Promops nasutus* (Spix 1823) (Gregorin and Chiquito 2010, Flores et al. 2015). *Promops centralis* is widely distributed throughout the Neotropical region

from Mexico southward to western Colombia, Peru to Paraguay, and northern Argentina (Eisenberg 1989, Reid 1997, Eger 2008). The species is polytypic, with 2 subspecies currently recognized: *P. c. occultus* Thomas, 1915 and *P. c. centralis* Thomas, 1915 (Gregorin and Chiquito 2010). *Promops centralis* is the only species of the genus present in Mexico (Ramírez-Pulido et al. 2014). The distribution of *P. centralis* in Mexico shows a disjunctive pattern, with unconnected populations located on the Yucatán Peninsula, the Pacific coast, the Sierra Madre del Sur Mountain chain, the Trans-Mexican Volcanic belt, and the coastal plains of the Gulf of Mexico (Téllez-Girón 2005, Solari et al. 2008, González-Terrazas 2016).

Molossid species occurring in the state of Veracruz are underrepresented in scientific collections; the only

**Table 1.** Species list of molossids from the state of Veracruz, Mexico (González-Christen and Delfín-Alonso 2016).

<b>Familia Molossidae</b>
<b>Subfamilia Molossinae</b>
<i>Eumops ferox</i> (Gundlach, 1862)
<i>Eumops nanus</i> (Miller, 1900)
<i>Molossus molossus</i> (Pallas, 1766)
<i>Molossus rufus</i> (É. Geoffroy Saint-Hilaire, 1805)
<i>Nyctinomops femorosaccus</i> (Merriam, 1889)
<i>Nyctinomops laticaudatus</i> (É. Geoffroy Saint-Hilaire, 1805)
<i>Nyctinomops macrotis</i> (Gray, 1839)
<i>Promops centralis</i> Thomas, 1915
<i>Tadarida brasiliensis</i> (É. Geoffroy Saint-Hilaire, 1824)

records of *P. c. centralis* in Veracruz are based on 2 museum specimens, both collected in the same locality in 1895 (Coates et al. 2017). Natural history information on *P. centralis* is scarce (Eger 2008). *Promops centralis* presents a seasonal monoestry pattern of reproduction, with a litter size of 1 (Sánchez-Hernandez et al. 2016). They have been found roosting in small groups (6–20 individuals) under palm leaves or tree bark and in hollow trees (Goodwin and Greenhall 1961, Eisenberg 1989, Hayssen et al. 1993, Eger 2008, Sánchez-Hernandez et al. 2016). The species is listed by the IUCN as Least Concern (Solari et al. 2008). Here we report the second record of this species in Veracruz in over 120 years, and confirm its presence in the state while representing a northerly expansion of its known range.

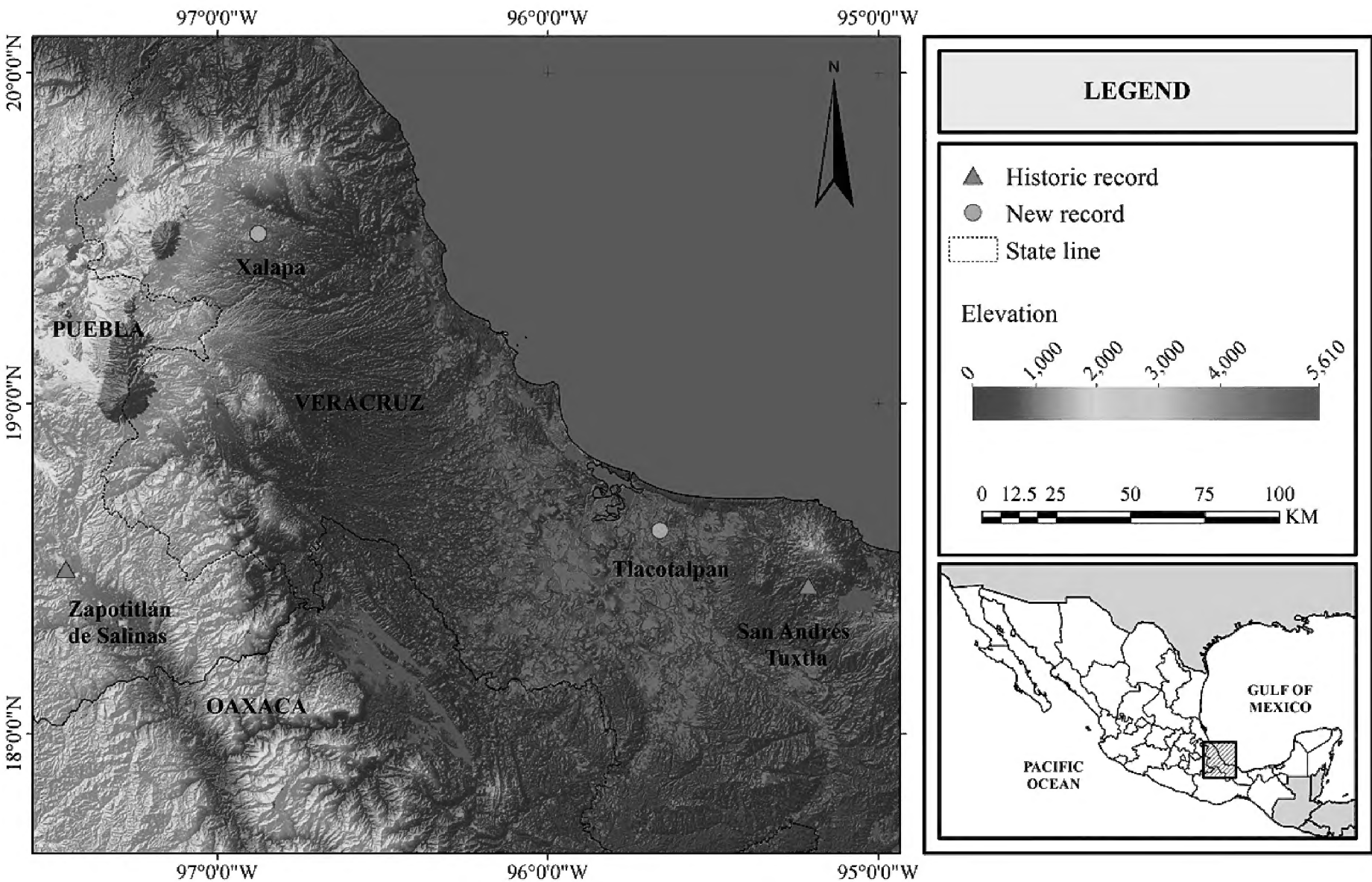
Methods

In 1988 and 2010, 3 specimens of *P. centralis* were collected (2 were found dead on the ground and 1 was captured by hand), prepared as standard museum study skins and housed as voucher specimens in the Colección de Mamíferos del Instituto de Investigaciones Biológicas, Universidad Veracruzana in Xalapa, Veracruz, Mexico (SEMARNAT VER-MAM-191-10-06), under the catalogue numbers IIB-UV 0521, IIB-UV 3956 and IIB-UV 3978.

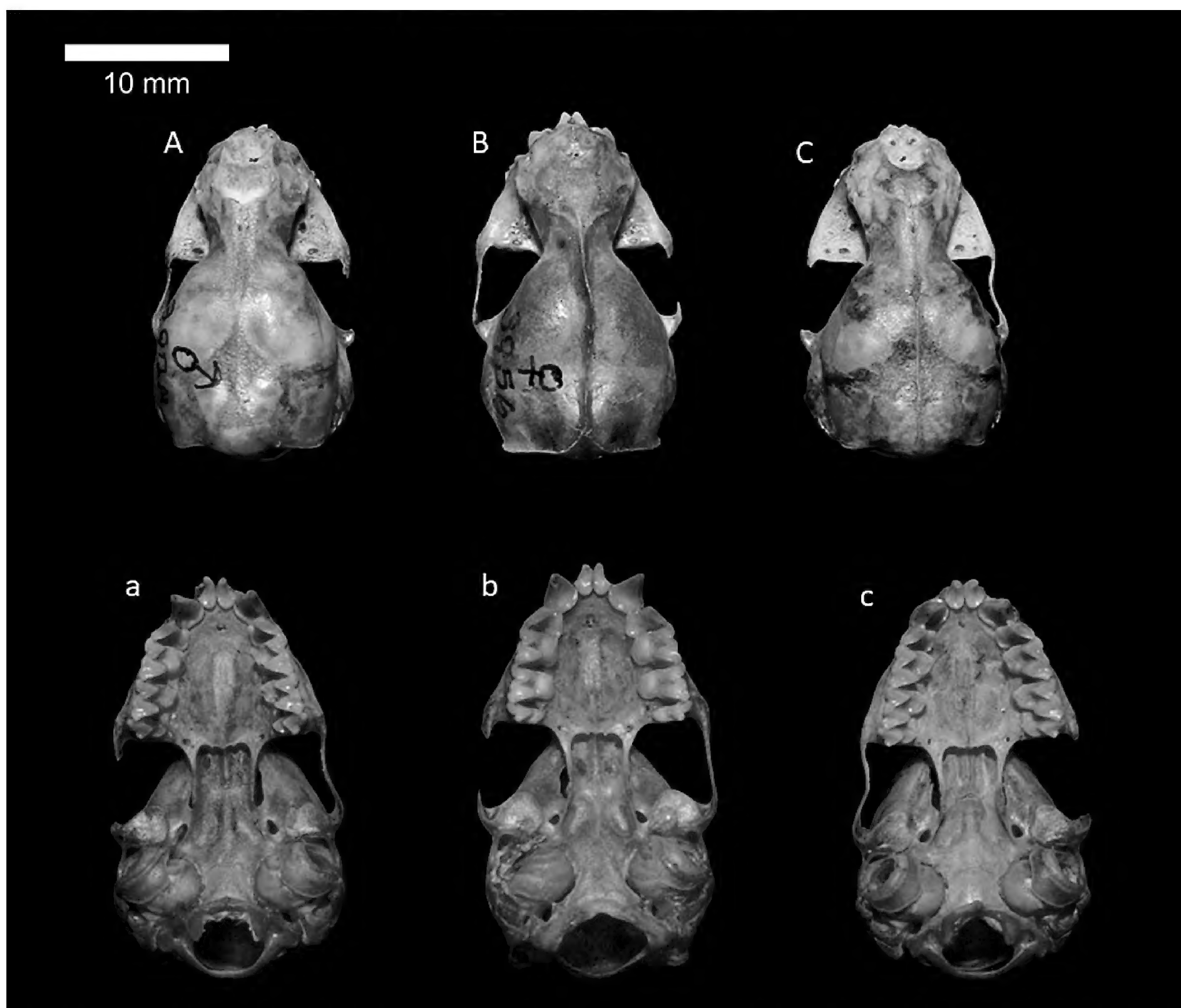
**Study site.** Our specimens came from 2 localities in the state of Veracruz: Tlacotalpan and Xalapa (Fig. 1).

Tlacotalpan (18°36' N, 095°39' W; alt. 10 m) is a small city; its climate is Aw''<sub>2</sub>(i') according to Köppen, modified by García (2004), hot wet tropical, with summer rains. The annual mean temperature is 17.9 °C and annual mean precipitation is 1515 mm (García 1981, Soto and Giddings 2011). The natural vegetation of Tlacotalpan was tropical rain forest but has since been transformed into agricultural land and induced grassland (INEGI 2013).

Xalapa (19°31' N, 096°55'W, alt. 1409 m) is a medium-sized city; its climate is C(f)aw''b(i') according to Köppen, modified by García (2004), humid subtropical, with an annual mean temperature of 19.1 °C and annual mean precipitation of 1515 mm (García 1981, Soto and Giddings 2011). The natural vegetation of Xalapa was originally characterized by a transition between seasonal



**Figure 1.** New records (yellow circles) and historical reports (red triangle) of *Promops centralis* in the northeastern portion of its distribution. Note the presence of The Sierra Madre Oriental between the localities of Zapotitlán de Salinas in the state of Puebla and Xalapa and Tlacotalpan, in the state of Veracruz, Mexico.



**Figure 2.** Dorsal and ventral views of the crania of three specimens of *Promops centralis*. (A, a) IIB-UV 3978 ♂, (B, b) IIB-UV 3956 ♀, and (C, c) IIB-UV 0521 ♂. Scale bar = 10 mm.

deciduous tropical forest (*Acacia cornigera* (L.) Willd., *Bauhinia* sp., *Brosimum alicastrum* Sw. *Bursera cinerea* Engl., *Ceiba* sp., *Cordia* sp., *Guazuma ulmifolia* Lam. and *Yucca periculosa* Baker), oak forest (*Quercus germana* Schltdl. & Cham., *Q. xalapensis* Humb. & Bonpl., *Q. laurina* Bonpl.), and cloud forest (*Inga jinicuil* Schltdl., *Liquidambar macrophylla* Oersted., *Platanus mexicana* Moric. and *Ulmus mexicana* Planch.), but this has now been transformed into urban areas, coffee plantations and induced grassland (INEGI 2013).

For identification, we used field guides (Medellín et al. 2008, Álvarez-Castañeda et al. 1994) and relevant scientific literature (Hall 1981, Eisenberg 1989, Eger 2008, Sánchez Hernández 2017). Cranial and forearm measurements were taken with a dial caliper (Mitutoyo Series 500, resolution 0.01 mm).

## Results

**New records.** Mexico, Veracruz, Tlacotalpan, Plaza San Miguelito, 18°36' N, 095°39' W; elevation 10 m, recorded by V. Mendoza Castillo, date collected 14 June

1988 (IIB-UV 0521, preserved specimen, male). Mexico, Veracruz, Xalapa, Plaza Américas, 19°31' N, 096°55' W; elevation 1409 m; elevation 10 m, recorded by C Alavez T, date collected 22 January 2010 (IIB-UV 3956, preserved specimen, female). Mexico, Veracruz, Xalapa, Instituto de Investigaciones Biológicas, 19°31' N, 096°55' W; elevation 1409 m; elevation 10 m, recorded by A. González Chr., date collected 27 September 2010 (IIB-UV 3978, preserved specimen, male).

The specimen IIB-UV 0521 was found dead on the ground at Plaza San Miguelito, Tlacotalpan. The specimen IIB-UV 3956 was found dead on the ground in the parking area of a large commercial center and the specimen IIB-UV 3978 was collected by hand when roosting under a pedestrian bridge.

We identified the 3 specimens as based on the following characteristics: upper lip lacking grooves; forearm length <55 mm; procumbent upper incisors, with non-convergent tips; upper incisors <½ height of canines; rostrum not flattened; palate conspicuously dome-shaped; well-defined basisphenoid pits; greatest skull length >20 mm (Fig. 2; Hall 1981, Eisenberg 1989, Eger 2008,



**Table 2.** External and craniodental measurements (mm) of the new records of *Promops centralis* collected from the state of Veracruz, México.

Measurements	IIB-UV 0521	IIB-UV 3956	IIB-UV 3978
Total length	125	139	117
Tail length	42	54	39
Length of hind foot	13	11	12
Length of ear	15	15	14
Length of forearm (dry)	49.30	50.87	50.13
Greatest skull length	20.82	21.02	20.86
Condyllocanine length	18.55	18.78	18.76
Braincase breadth	10.57	10.47	10.56
Interorbital constriction breadth	4.52	4.33	4.53
Zygomatic breadth	12.60	12.67	12.34
Rostral breadth	11.33	11.93	11.18
Mastoid breadth	9.80	9.52	10.05
Mandible length	14.75	14.58	14.58
Maxillary tooththrow length	7.74	7.88	7.78
Mandibular tooththrow length	9.55	9.46	9.43

Medellín et al. 2008, Sánchez Hernández 2017). All the measurements fall within the known range of variation for the species (Table 2; Hall 1981, Eisenberg 1989, Eger 2008, Medellín et al. 2008, Sánchez Hernández 2017).

Discussion

Two biogeographic regions converge in the state of Veracruz (Arita and Paniagua 1993); the Nearctic region reaches its southernmost area of distribution and the Neotropical region its northernmost distribution area. The Nearctic region overlaps with the Neotropical region in the Mexican Transition Zone (Escalante et al. 2013). Consequently, Veracruz has a rich biota, representing one of the most diverse areas of Mexico and is also one of the most studied; however, at least for mammals, many gaps remain.

Bats of the genus *Promops* are poorly represented in museum collections (Flores et al. 2015), *Promops centralis* has historically been considered uncommon in Veracruz, probably due to this factor. It was known from just 2 specimens collected by Auguste Salle in 1857 in the same locality, San Andrés Tuxtla (18°26' N, 095°12' W) and deposited in the collections of the British Museum of Natural History Museum London, UK (Arroyo-Cabrales and Ramos Rivera 2017, Coates et al. 2017). González et al. (2002) erroneously reported *P. centralis* from the locality of “El Conejo” (19°31' N, 097°08' W, alt. 3540 m), our reexamination of that specimen revealed that it is actually a *Molossus rufus* É. Geoffroy Saint-Hilaire, 1805.

Our records from Xalapa are not only the second report for this species in over 160 years in Veracruz but also a northern extension of the known range by a linear distance of 216 km from the records in San Andrés Tuxtla, and 162 km northwest and 146 km northeast from a locality along the Zapotitlán River east of Zapotitlán de las Salinas, in Puebla (18°29' N, 097°27' W; Fig. 1), which are the closest known localities of the species. However, the records from Puebla and Veracruz are separated by

the highlands of the Sierra Madre Oriental Mountains and the Trans-Mexican Volcanic Belt. These mountain systems have topographical features characterized by an altitudinal gradient from 0 to 6200 m and such conditions would be likely to preclude the displacement of the populations of *P. centralis* from Puebla to Veracruz, and therefore these 2 populations appear to be physically isolated from each other.

The new locality records and range extensions presented here contribute to filling the gaps in distribution of *P. centralis* in Veracruz, Mexico. While these records do not significantly increase the ranges of *P. centralis*, our results provide an insight into the extent of undersampling of molossids in Veracruz and highlight the urgent need for a more intensive inventory in other localities using other methods, such as acoustic detection.

Our data also confirm the potential distribution model of *P. centralis* proposed by Ceballos et al. (2006) for Veracruz. Recently, González-Terrazas et al. (2016) increased the distribution of *P. centralis* northward from Jalisco state to Bahía de Kino in Sonora state via the Pacific coast. Our records along with the one of González-Terrazas et al. (2016) should be included in any new analysis to reassess the potential distribution of *P. centralis*.

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Authors’ Contributions

ATC, GCA and RSNV wrote the text; ATC and GCA collected the specimens; GCA examined the specimens and verified identification.

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